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# Housing in a Bottle

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# Housing in a Bottle

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**Advisor: Professor Diran Apelian**

## Background

- Half of the families in Paraguay are below the poverty line.
- Up to three generations live under one roof.
- There is an increasing number of drought periods in Paraguay.

## Objectives

- Construct the add-on as a model for for low-income families and future projects.



A compression test on a half liter bottle tightly packed with sand.



The bio-sand filter

## Method/Process

- Ran compression tests, testing both half liter and two liter bottles filled with air (as a base line), packed with sand, and filled with sand.
- Skype calls with client to clarify our goals in order to meet the necessity.

## Abstract

- Design low-cost add-on room for the beekeeping center in the San Francisco Agricultural School in Paraguay out of plastic bottles.
- Create an instruction manual in English and Spanish.



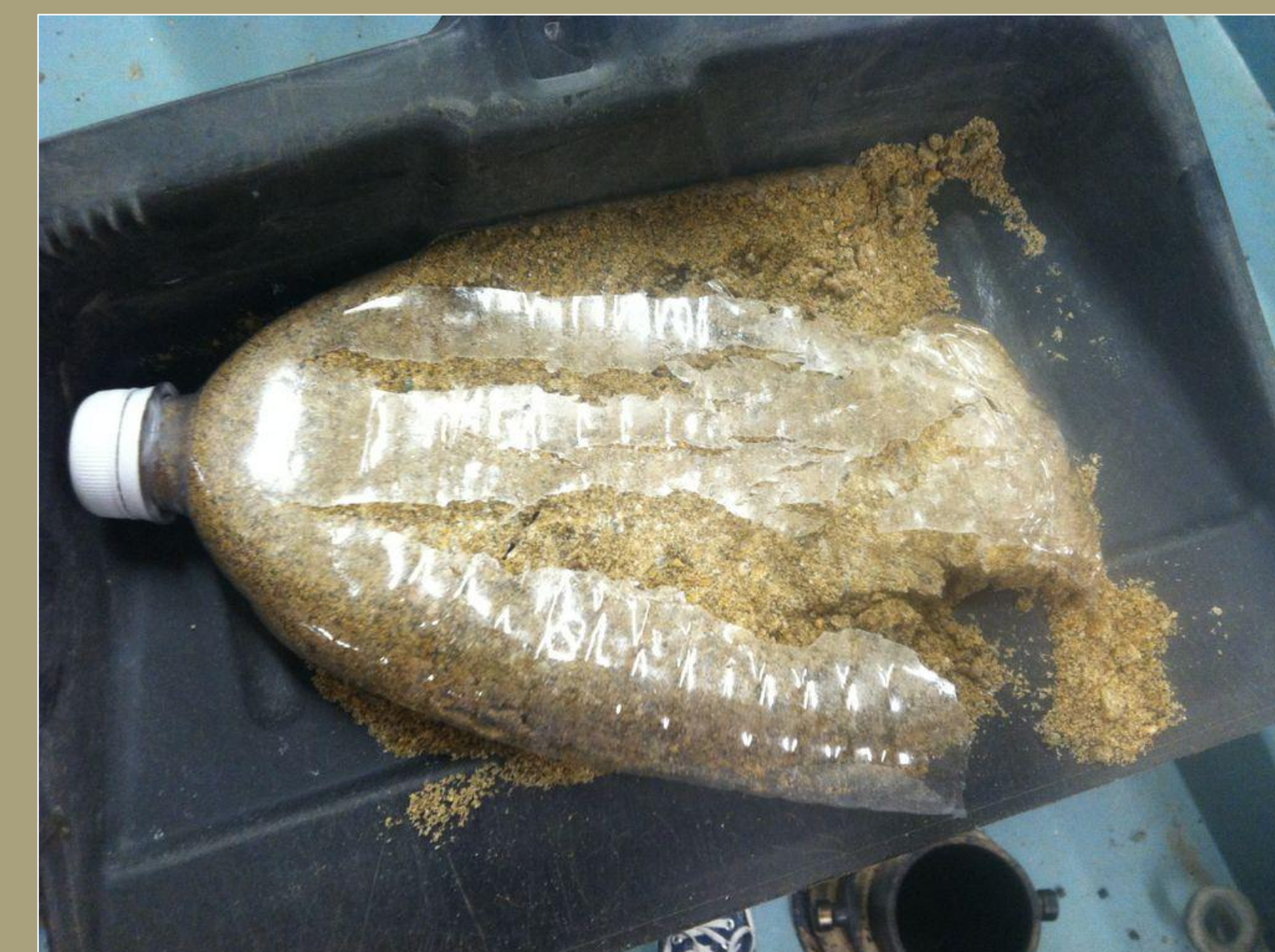
Bee-keeping center at the San Francisco Agricultural School in Asunción, Paraguay.

## Results/Outcome

- A two liter bottle filled with sand can support 7,000 more pounds than a two liter bottle tightly packed with sand.
- At the maximum required load of 2,000 pounds, the deflection of the two liter bottle tightly packed with sand is half the deflection of the two liter bottled filled with sand.
- Two liter bottles tightly packed with sand are the best building materials.



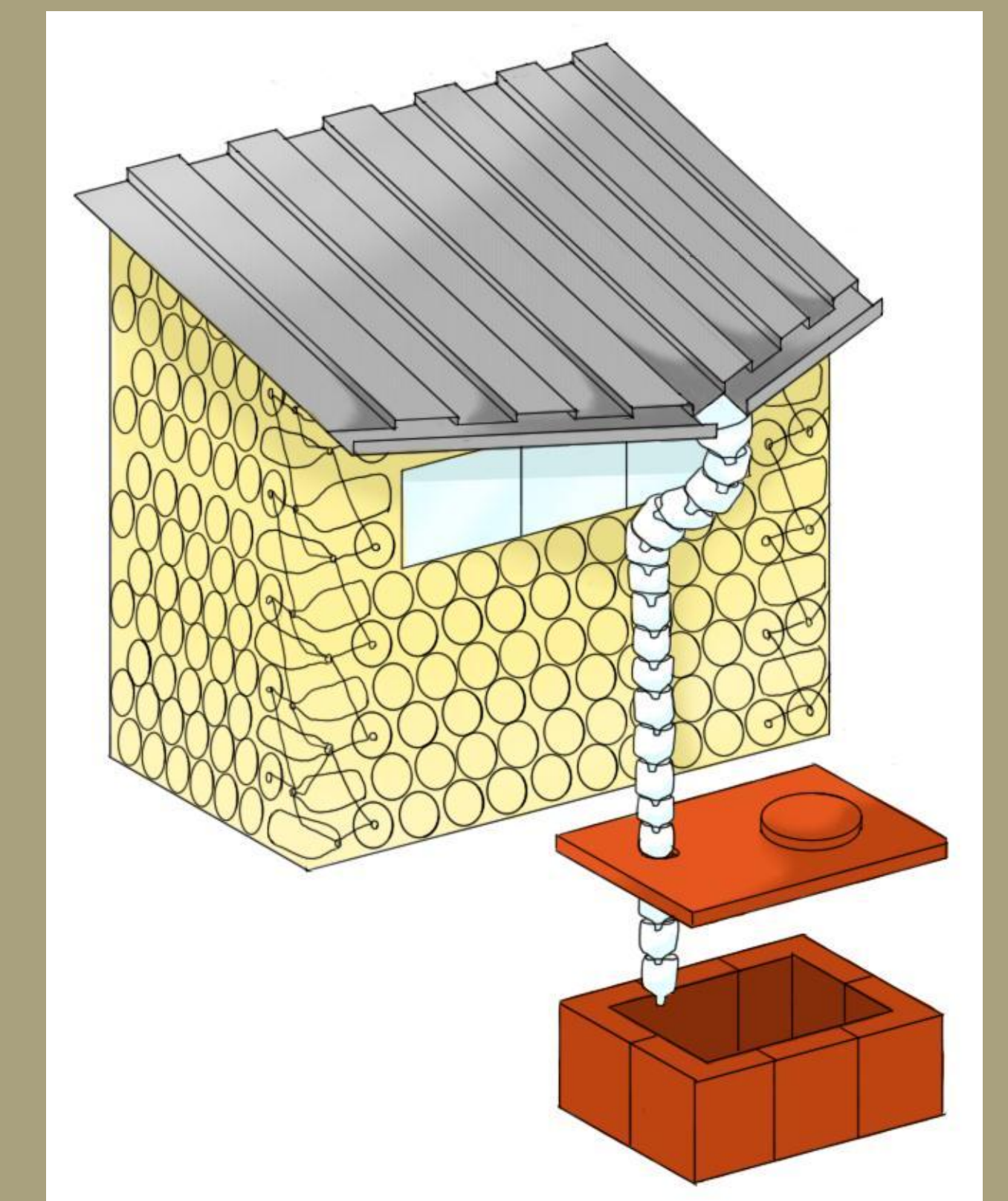
A 2 liter bottle tightly packed with sand after the compression test



A half liter bottle tilted with sand after the compression test

## Final Design

- Bottles stacked horizontally in staggered pattern.
- Bottle necks tied together with string and secured with adobe.
- Rainwater collection system and bio-sand filter to clean water.



The final design of the add-on room

## Conclusion

- Create walls using 2 liter plastic bottles tightly packed with sand.
- Add-on will alleviate overcrowding issues.
- Rainwater harvesting roof system supplies water in the dry season.
- Low-cost and sustainable design which can be implemented worldwide.

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